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# United States Patent [19]

Honkasalo et al.

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[54] CONTROL OF HANDOVER AND TRANSMISSION POWER CONTROL OF MOBILE STATION IN A MOBILE TELECOMMUNICATIONS SYSTEM

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[\*] Notice: This patent is subject to a terminal disclaimer.

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## Related U.S. Application Data

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[51] Int. Cl.<sup>6</sup> ..... **H04Q 7/22**

[52] U.S. Cl. .... **455/437; 455/522; 455/67.1; 455/226.1**

[58] Field of Search ..... 455/436, 437, 455/438, 439, 450-52, 500, 501, 517, 522, 525, 67.1, 726.1, 226.2, 226.3, 435; 375/200

## References Cited

### U.S. PATENT DOCUMENTS

4,763,322	8/1988	Eizenhofer	370/95
4,972,506	11/1990	Uddenfeldt	455/33
5,199,031	3/1993	Dahlin	320/110.1
5,579,373	11/1996	Jang	379/59
5,603,081	2/1997	Raith et al.	455/435

### FOREIGN PATENT DOCUMENTS

332 818	9/1989	European Pat. Off.	.
615 353	9/1994	European Pat. Off.	.
0 671 824 A1	9/1995	European Pat. Off.	.

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## ABSTRACT

The invention relates to controlling transmission power and carrying out a handover during a data transmission over the radio path between a mobile station and a base station (BTS) in a mobile telecommunications system. A mobile station can be allocated at least two traffic channels for a high-speed data transmission. The mobile station is arranged to measure the characteristics of the received signal, such as the signal level and/or quality, in each of the allocated traffic channels. The radio network is arranged to control the transmitting power of the mobile and base stations and make the decision on a handover on the basis of a combination of measurement results of two or more traffic channels, or on the basis of the measurement result of the poorest traffic channel.

42 Claims, 9 Drawing Sheets

